IN THE DRAWINGS:

A replacement drawing sheet is submitted for Figure 3.

In Figure 3, numbers “101”, “102”, “120a”, “120b”, “110a”, and “110b” have replaced by numbers “301”, “302”, “320a”, “320b”, “310a”, and “310b”.

REMARKS

Claims 9-18 remain in this application.

Amendments

The specification has been amended to correct a translation error.

Figure 3 of the drawings has been amended to be consistent with the specification, i.e., in Figure 3, numbers “101”, “102”, “120a”, “120b”, “110a”, and “110b” have replaced by numbers “301”, “302”, “320a”, “320b”, “310a”, and “310b”. See the specification beginning with line 26 of page 7.

No new matter is entered by these amendments.

Rejection Under 35 USC 103

Claims 9-18 stand rejected as obvious over YAMAMOTO 5,811,958 in view of KINOSHITA 6,157,165.

Applicant respectfully disagrees.

The claims have been amended and are supported by the specification:

- page 3, lines 5-11 (switch for discharging the storage capacitor into the battery triggered when a predetermined energy of said storage capacitor is attained), and

- page 8, lines 8-10 (the discharge time of the storage capacitor is a fixed time).

A discharge pulse of the storage capacitor: - with fixed duration, and

- beginning when a predetermined energy threshold of the storage capacitor is attained, is a discharge pulse with predetermined energy.

Note here that monitoring a predetermined voltage threshold over the terminals of the storage capacitor is the same thing as monitoring predetermined energy threshold attained by said storage capacitor:

$E = 1/2C(U^2 - U_0^2)$ where:

- E is the energy stored by the capacitor,

- U is the voltage over the terminals of the capacitor, and

- U_0 is the voltage at battery terminals, and

- C is the capacity of the capacitor, that is to say a constant.)

YAMAMOTO

I. Different technical fields:

On the one hand, the subject matter of applicant's invention is to allow various sources of un-stabilized direct current by providing a constant quality of charge.

One the other hand, YAMAMOTO's subject matter is to extend the operation of the load circuit, so that charging will be possible in time zones where there is no sunlight or on overcast or rainy days (column 6, lines 17-24), as batteries must be charged at a constant current (column 6, lines 46-47). The

subject matter is “how to carry out the charging from the rapid-charging secondary battery over a long period of time” (column 7, lines 35-37).

In conclusion, the subject matter of YAMAMOTO is very different from the subject matter of applicant’s invention.

YAMAMOTO and applicant’s invention belong to very different technical fields and one skilled in the art would not have consult YAMAMOTO in order to solve the matter consisting of allowing various sources of un-stabilized direct current.

II. Different technical solution: pulses

On the one hand, the solution of applicant’s invention uses the technique of current **pulsing** from a switched capacitor.

Said invention comprises:

- monitoring a predetermined voltage threshold over the terminals of a storage capacitor;

- connecting said capacitor to a battery during a predetermined time.

Applicant’s device enables to produce energy pulses of **predetermined energy** in order to provide a good quality of charge no matter how the source fluctuates.

One the other hand, YAMAMOTO’s solution for having a long charging time is to use energy stored in the electric double layer battery (column 4, lines 30-32).

During the day, the double layer battery (3) is charged and the constant voltage battery is charged by the overflow current. At night or on overcast days, the charging current is supplemented to the battery of the following stage.

As acknowledged by the Examiner's Opinion, YAMAMOTO does not disclose detecting a predetermined voltage **threshold** over the terminals of a storage capacitor and **connecting** said capacitor to a battery **during a predetermined time**.

In conclusion, the solution proposed in YAMAMOTO is very different from the solution proposed by applicant's invention. In particular, YAMAMOTO does not disclose an energy transfer through discharge **pulses**, as the different elements are permanently connected. Moreover, YAMAMOTO does not disclose the **monitoring** of a voltage **threshold**. Thus, YAMAMOTO does not disclose a charge through pulses of predetermined energy.

III. Different technical solution: the DC-DC converter

On the one hand, the solution of applicant's invention consists in:

- converting the DC voltage from a direct-current source into a DC voltage which is higher than the nominal voltage of the battery to be charged, and then

- applying said higher DC voltage to the terminals of a storage capacitor, so as to transfer energy into said storage capacitor. The battery is not directly connected to the DC-DC

converter. The storage capacitor can absorb the current fluctuations.

On the other hand, in YAMAMOTO, the DC-DC converter is directly connected to the battery. There is no fluctuation absorption between the DC-DC converter and the battery.

The double layer battery (3) is just a high-pass circuit. Contrary the applicant's invention, the double layer battery is not switched.

Moreover one can remark that the double layer battery (3) according to YAMAMOTO could not absorb the fluctuations of the source as in case of a solar panel have cycles of several hours.

In conclusion, the solution proposed in YAMAMOTO is very different from the solution proposed by applicant's invention as there is no switched capacitor.

IV. Different technical solution: loss

On the one hand, applicant's invention aims to minimize the losses. The voltages given to the battery can be adjusted through the predetermined voltage threshold, without any loss, as so to reach optimal efficiency.

On the other hand, YAMAMOTO discloses an optional switch (6) to choose a resistance, in order to adjust the voltage given to the secondary battery of the last stage, implying thus losses and low efficiency.

In conclusion, the solution proposed in YAMAMOTO is very different from the solution proposed by applicant's invention as the matters of concern are different.

KINOSHITA

The technical domain of KINOSHITA is the uniformly share voltage among batteries (column 1, lines 17-18). In order to detect correct values of the voltage and the current for a battery needing to be accurately controlled, the solution proposed by KINOSHITA is to detect the voltage of the batteries by detecting the voltage of an electric energy storing means, such as a capacitor, which is charged by the batteries (column 3, line 65- column 4, line 4).

The passage cited by the Examiner refers to our previous description of figure 1:

· A capacitor (111) is step charged by one of the unit batteries (101a) until the voltage of the capacitor (111) and of the unit battery (101a) become almost the same. This is detected by the voltage detecting means (110) comprising for example a comparator (column 9, lines 16-17).

· After that, the voltage detection is shifted from the unit battery (101a) to the unit battery (101b).

· **Only if** the voltage of the capacitor (111) is higher than the voltage of the unit battery (101b), the capacitor (111)

discharges to the unit battery (101b) (column 8, line 42 to column 9, line 12).

Thereby, the detection of a voltage reference value which is here the voltage of the unit battery (101a) leads to the connecting of the capacitor (111) to the unit battery (101b) but does **not necessarily lead to an energy transfer**.

According to KINOSHITA, the voltage threshold is determined by the voltage of the first unit battery (101a), whereas according to applicant's invention, **the voltage threshold is not limited by the source**.

Moreover, applicant's invention enables an optimal energy transfer as the energy transfer **does not depend on a difference of voltages between two batteries**.

The consequence of such an independent voltage threshold is the following:

- if the battery is supplying energy, his voltage will slowly decrease;

- as the voltage decreases very slowly, a voltage difference is difficult to measure.

o According to KINOSHITA , if the voltage of the capacitor (111) is not higher than the voltage of the unit battery (101b), the capacitor (111) does not discharge to the unit battery (101b).

It is a voltage difference between the voltage of the capacitor (111) and than the voltage of the unit battery (101b), that causes the charge of the unit battery (101b).

The unit battery (101b) is not charged if it had attained a predetermined voltage.

o If the unit battery (101b) is supplying energy, it needs to be charged in the same time, but it won't be charged as the voltage difference will be very small and then very difficult to measure, implying thus production over costs to obtain the accuracy required by operation.

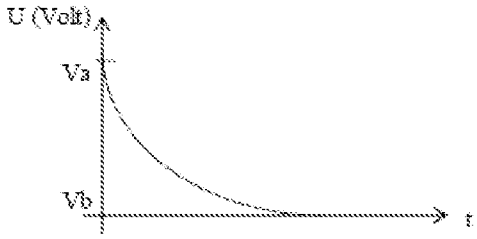
o On the contrary, according to applicant's invention, such a difficulty is solved as the charge of the battery does not depend on the voltage over the terminals of said battery. The applicant's invention operates with lowprecision measurements and allows optimal production costs.

Moreover, the direct-current source which is the unit battery (101a) is **not a source liable to significant fluctuations**.

Moreover, if there is an energy transfer, **the charge pulses are not of predetermined energy**:

· The transferred energy corresponding to a pulse is calculated thanks to the following equation:

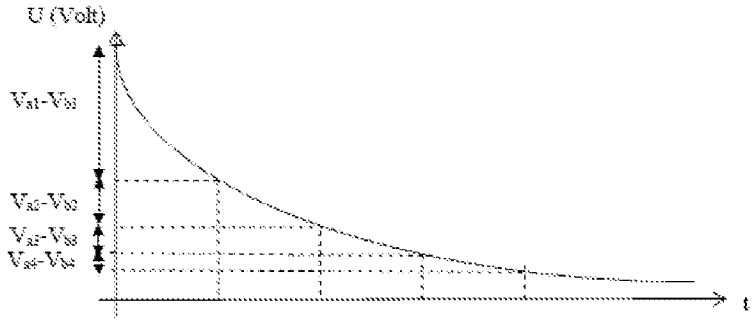
$E = C/2(V_a^2 - v_b^2)$



According to KINOSHITA:

Like the charge (see in particular Figure 2 of KINOSHITA), the discharge of the capacitor is progressive. KINOSHITA discloses a fixed duration of each pulse (see figure 2), implementing thus a regular delivery of the pulses at decreasing energies. Va is the voltage previously attained after the previous discharge pulse.

KINOSHITA gives priority to the regularity of the pulses.



· According to the invention:

The invention gives priority to the strength and the form of the discharge pulse, no matter the periodicity of the delivery of discharge pulses; see in particular specification page 2, lines 11-13.

Therefore, the invention and KINOSHITA are very different from each other.

KINOSHITA does not disclose an energy transfer through a discharge pulse with predetermined energy, but regularly delivering of pulses with very irregular energies.

KINOSHITA also discloses (see Fig. 7) the measure of the voltage between the terminals of a battery row (101) in order to monitor a charging and discharging control converter (704). The aim of the voltage threshold is to stop an operation that permits the batteries to supplement a commercial power supply (701) and solar-electric power generator (702) or to be charged up when less electric power is consumed by loads (703).

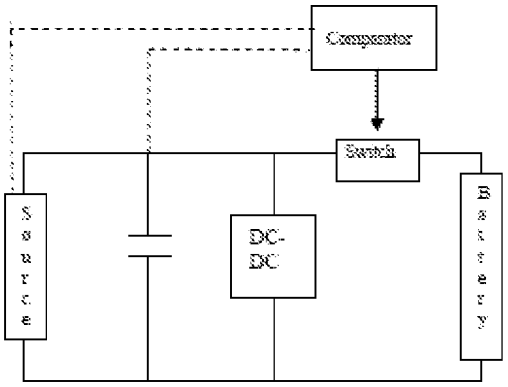
The voltage threshold here just controls the stopping of a charging or discharging operation.

The step of *"upon detection of said voltage threshold, connecting said storage capacitor to said battery during a predetermined time, so as to transfer energy of a discharge pulse with predetermined energy from said storage capacitor into said battery"* is not disclosed.

There is no motivation for one skilled in the art to combine YAMAMOTO with KINOSHITA.

Moreover, as explained above, if one skilled in the art had carried out a device according to YAMAMOTO with the threshold monitoring according to KINOSHITA, one would have obtained a threshold depending on the voltage of the source and regular pulses with disparate energies.

It would not have solved the technical matter of applicant's invention.



Consequently, the invention is non-obvious with regard to cited prior art.

In that the independent claims are both novel and non-obvious, both the independent claims and the claims depending therefrom are patentable.

Reconsideration and allowance of all the claims are respectfully requested.

This response is believed to be fully responsive and to put the case in condition for allowance. An early and favorable action on the merits is earnestly requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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REL/fb

APPENDIX:

- Replacement drawing sheet for Figure 3